

THE IMPACT OF GREEN ACCOUNTING AND SUSTAINABILITY PERFORMANCE: A BIBLIOMETRIC ANALYSIS

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ABSTRACT

This study is intended to identify recent research developments related to the topic of green accounting and its correlations with sustainability performance. The analysis was conducted using R Biblioshiny for initial visualization, and VOSviewer for research network mapping and topic clustering. The study involved at least 1684 documents published between 1991 and early 2024. The study found a progress in research related to green accounting and sustainability performance. According to affiliation and country, green accounting and sustainability performance research is dominated by China. There are ten clusters formed, such as sustainability and green economy, as well as sustainability performance and sustainability economy. This study provides researchers with an insight into the dynamics of green accounting and research on sustainability performance and suggests potential areas of emerging research. While this research appears to have been conducted thoroughly, it is limited by the coverage of the Scopus database, which does not contain all relevant papers. The uniqueness of this research comes from the use of well-organized bibliometric analysis approach to analyze green accounting and sustainability performance, which has not been done in the previous literature.

Keywords: Bibliometric, Biblioshiny, VOSviewer, Green Accounting, Sustainability Performance

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INTRODUCTION

Technological advances in the modern economy are growing rapidly and have created a number of problems related to environmental degradation (Angelina & Nursasi, 2021). Industry practitioners compete to produce valuable products (Hakim & Aris, 2023) in order to maintain survival and achieve maximum profits (Murniati & Sovita, 2021) (Hidayat & Aris, 2023) and sometimes ignore the environmental impacts caused by these business activities (Rosaline & Wuryani, 2020). Companies that are disrespectful of the environment and its potential are very large (Putri et al., 2019) and tend to overexploit natural resources (Ningsih & Rachmawati, 2017).

Social change, environmental degradation and public interest are driving sustainability issues into the forefront of academia, governments and business sectors (Büyüközkan & Karabulut, 2018). Environmental conservation efforts in the scope of accounting are known as green accounting, which is considered a method that can be implemented by companies to overcome environmental problems (Malik & Juliardi, 2023). Green accounting practices have the potential to minimize environmental problems (Hamidi, 2019), improve the efficiency of environmental management (Rahma Dewi, 2016), increase the company's advantage in attracting consumer attention (Hakim & Aris, 2023), and be able to improve the company's image as a form of competitive advantage (Deswanto, 2022).

Based on this data, the topic of green accounting and sustainability performance is crucial and takes an important role that needs to be considered in carrying out the company's operational activities. However, so far there is no benchmark that can determine the extent of research development on this topic. Therefore, a bibliometric review on this topic is required.

There has not been much previous research related to bibliometric analysis to determine the trends of these two topics. Research conducted by Taqi et al., (2021), Dermawan et al., (2023) highlighted the topic of green accounting only. Previous research also recommends further research in the field of green accounting (Nidhi & Anand, 2022). The difference between this research and previous research is terms of objects, this research was conducted on the scopus database, unlike previous studies that used google scholar (Sari et al., 2023) (Nur et al., 2023) and *dimensions.ai* (Dermawan et al., 2023). Scopus was chosen as the object because Scopus is a data provider that contains a list of reputable international journals. Furthermore, the variables examined in this research consist of green accounting and sustainability performance, in contrast to previous studies which tend to highlight the topic of green accounting only. Meanwhile, the analysis method used in this research was using Biblioshiny and VOS viewer.

LITERATURE REVIEW

Sustainability Theory

Sustainability theory emphasized the importance of integrating sustainability in business strategies as a step towards long-term achievement economic goals, while considering social and

environmental impacts (Pemer et al., 2020).

Green Accounting

Green accounting focuses on being an environmental management media and communication instruments with the community (Maryanti & Hariyono, 2020) and is able to have a positive impact on the environment so that the company's image becomes better (Deswanto, 2022).

Sustainability Performance

Sustainability can provide a business strategy that meets the company's expectations while simultaneously caring for, preserving and enhancing social assets and natural resources in the future (Büyüközkan & Karabulut, 2018). Sustainability in this research refers to the concept of triple bottom line, proposed by Elkington, (1997). Sustainability can be realized by maintaining a balance between environmental, social, and economic parameters (Asadi et al., 2020).

Bibliometric Analysis

One of the methods that can be used to analyze bibliographic data acquired from many literatures such as journals, journal quality, journal maturity, and others is bibliometric analysis (Septikha, 2022). Bibliometrics concerns the patterns, trends, and influence of research recorded in various sources, scholarly journals, books, conferences, academic literature (Taqi et al., 2021).

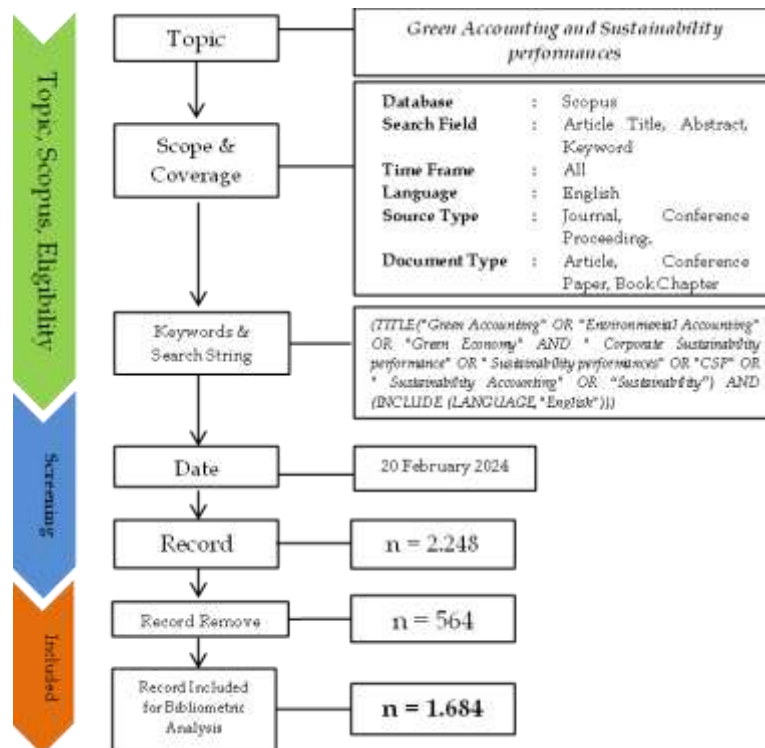
METHOD

Research Design

The type of this search is a literature study through a descriptive qualitative approach through bibliometric analysis. The bibliometric method is used to conduct qualitative analysis, such as content analysis or other qualitative analysis to understand the issues expressed in certain scientific publications (Dubyna et al., 2022).

Data Collection

This research uses the Scopus database as a data source that loads abstracts and citations of research in reputable journals. This study identifying articles relevant to the research objectives through keyword search string. Data collection was carried out according to the flowchart of the traceability strategy, as shown in Figure.



Source: (Zakaria et al., 2023) reprocessed

Figure 1. Flow Diagram of The Search Strategy

The search strings used in the Scopus database include article title, abstract and keywords to produce data that is most relevant to the topic of this research. The developed traceability approach is: (TITLE ("Green Accounting" OR "Environmental Accounting" OR "Green Economy" AND " Corporate Sustainability performance" OR " Sustainability performances" OR "CSP" OR " Sustainability Accounting" OR "Sustainability") AND (INCLUDE (LANGUAGE,"English")))

Data Analysis

The data analysis technique utilized is Biblioshiny instrument for the statistics baseline analysis and visualization of bibliometric findings and VOSviewer software for research network

mapping and topic clustering. Bibliographic data from Scopus was then processed into Biblioshiny and VOSviewer to get a comprehensive bibliometric analysis.

RESULT AND DISCUSSION

Research Profile



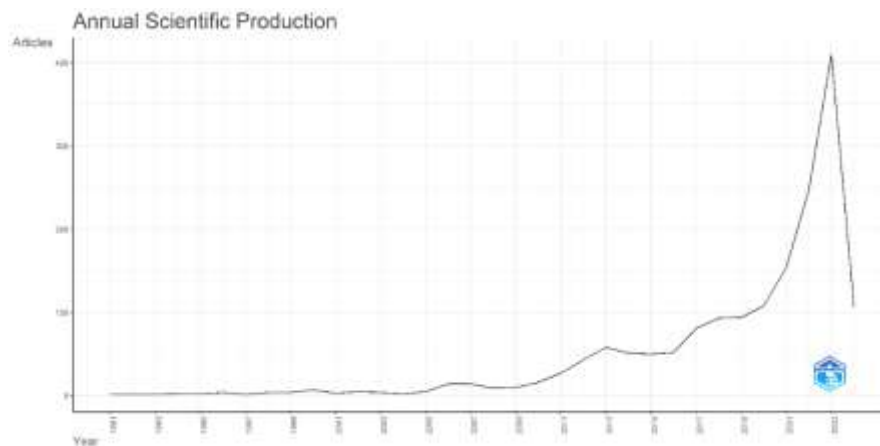
Source: Output Biblioshiny, 2024

Figure 2. Main Information About Data

Research on green accounting and sustainability performance has been researched since 1991 with sources dominated by journals and several books. By early 2024, the number of documents produced had reached 1684. The total amount of documents identified is 1684 documents consist of 4 types, and journal articles are no exception. (1545 documents), articles (16 documents), conference papers (122 documents), and conference articles (1 document). Sources of scientific publications on green accounting issues and sustainability performances increased significantly, with an average increase of 15.18%. This indicates the growing interest and attention of researchers in both topics and represents the urgency to develop solutions and best practices in addressing the environmental and sustainability challenges confronted by the global community. The relatively low document average age of 4.99 suggests that the field of green accounting and sustainability performances research is dominated by recent and recent publications. This shows the dynamic and fast-paced nature of this area of study, where new findings continue to emerge to address evolving challenges. The average citation per document figure of 23.39 indicates that each related scientific document or publication is cited an average

of 23.39 times by other publications. The results of bibliometric data processing also show that there are 5,138 terms in Keywords Plus (ID) and 4498 terms in Author's Keywords (DE), providing a holistic overview of the breadth and complexity of research. The topic of green accounting and sustainability performance has attracted significant interest among researchers, is apparent in the total number of authors reaching 4937. This number shows how diverse the researchers contributing to this field are, from various institutions and countries, and from various disciplines.

Annual Scientific Production



Source: Output Biblioshiny, 2024

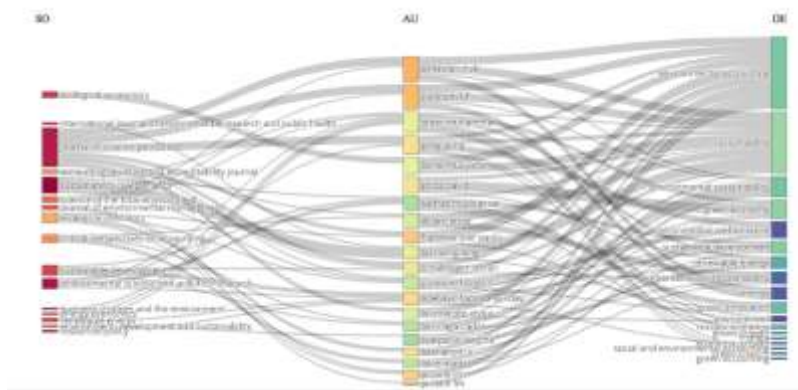
Figure 3. Annual Scientific Production

The increase in green accounting and sustainability performance research publications began with one document published in 1991. This topic received less attention in the early decades, the research of this period is indicated to be still at an early exploratory stage, focusing on the development of basic concepts and methodologies. Then, a gradual increase in publications began to be seen in the second decade from 2000 to 2010. The graph starts to show a significant acceleration of growth in the number of publications since 2010. The peak of publication increase is seen in 2023 as the most productive year that achieved 410 publications. This research continues to grow and shows a steady upward trend to date.

Three Fields Plot

A representation of the whole data is shown by the top 20 data. Some relevant sources can be reviewed on the left. The largest square symbol indicates sources that are most relevant, in

this topic is the Journal of Cleaner Production which is the publication source for authors such as Almeida CMVB, Giannetti BF, Geng Yong, Franzese Pier Paolo, Schaltegger Stefan, and Buonocore Elvira. Some of the research themes of green accounting and sustainability performance include: environmental accounting, sustainability, environmental sustainability, sustainability development, and CSR.

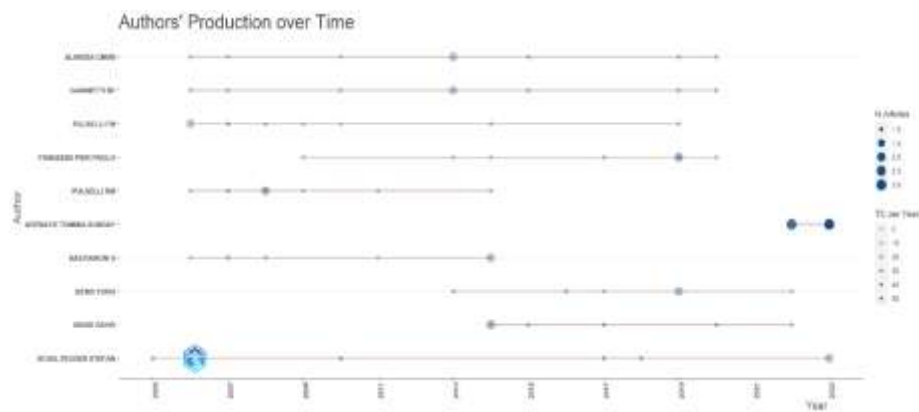


Source: Output Biblioshiny, 2024

Figure 4. Three Fields Plot

Researcher Productivity

The increasing focus on green accounting and sustainability performance is beginning to be linked to the global need to address environmental issues and achieve sustainable development. This phenomenon shows that academics, practitioners, and policy makers have prioritized sustainability issues.



Source: Output Biblioshiny, 2024

Figure 5. Authors' Production over Time

A number of research on green accounting issues and sustainability performance are conducted individually, the single-authored documents which show 268 documents with a single author. The results of biblioshiny analysis show a fairly high level of collaboration, the average value of Co-Authors per Doc which is 3.25 authors per document. The high level of collaboration reflects the need for an interdisciplinary approach in addressing issues related to green accounting and sustainability performance, which involves economic, environmental, and social aspects. Not only that, the percentage of international co-authorships of 31.59% shows that almost a third of the research in this field involves authors from various countries. A total of 254 authors out of a total of 4937 of them are authors of Single documents.

Authors' Productivity through Lotka's Law

Based on the number of publications, highest citations, and author productivity, Almeida CMVB and Giannetti BF are closely competing at the same rank. These three are part of the 0.6% most productive authors of all time. Meanwhile, in terms of Lotka's law graph, 93% of researchers, totaling 4588 out of a total of 4937, only produced 1 article, 5% of them produced 2 articles, 1% of researchers produced 3 articles, while less than 1% of researchers were able to produce more than 3 articles.

Table 1. Authors' Productivity through Lotka's Law

Documents written	N. of Authors	Proportion of Authors
1	4588	0,9293093
2	253	0,0512457
3	52	0,01053271
4	23	0,0046587
5	9	0,00182297
6	7	0,00141787
7	2	0,0004051
8	3	0,00060766

Source: Output Biblioshiny, 2024

Most Relevant Authors

There are 10 authors who are most relevant to the theme of green accounting and sustainability performance. The top three are Almeida CMVB from Universidade Paulista Brazil, Giannetti BF from Universidade Paulista Brazil, Pulselli FM University of Siena, Italy with the same number of publications of 8 publications. Furthermore, Franzese Pier Paolo from Parthenope University of Naples Italy, and Pulselli RM from University of Siena Italy followed with the same number of publications of 7 publications.

Table 2. Most Relevant Authors

Element	h_index	g_index	m_index	TC	NP	PY_start
Almeida CMVB	7	8	0,36842105	325	8	2006
Giannetti BF	7	8	0,36842105	325	8	2006
Franzese Pier Paolo	6	7	0,375	293	7	2009
Gibbs David	6	6	0,54545455	333	6	2014
Umar Muhammad	6	6	1,5	549	6	2021
Adebayo Tomiwa S	5	6	1,66666667	237	6	2022
Bartelmus Peter	5	5	0,19230769	174	5	1999
Bastianoni S	5	6	0,26315789	425	6	2006
Dillard Jesse	5	5	0,25	519	5	2005
Geng Yong	5	6	0,41666667	213	6	2013

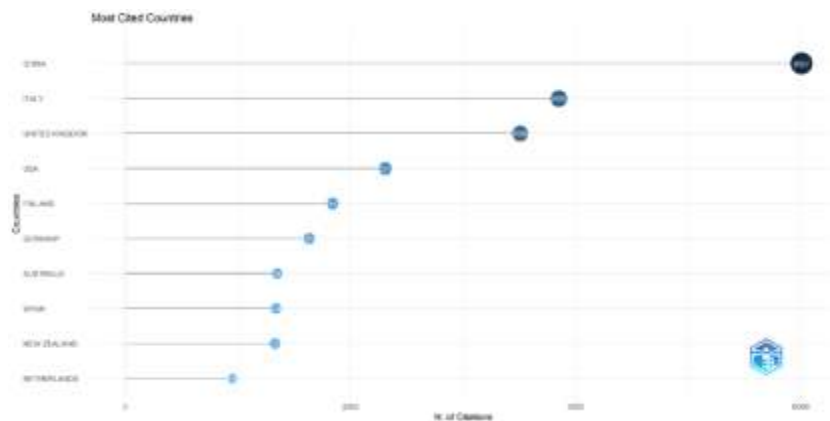
Source: Output Biblioshiny, 2024

Almeida CMVB and Giannetti BF with the same h_index of 7, both have produced 8 documents and received 325 citations from other researchers. Followed by Franzese Pier Paolo who produced 7 documents with a total citation of 293, Gibbs David produced 6 documents with a total citation of 333, and Umar Muhammad produced 6 documents with a total citation of 549, all three of which were at the same h_index level of 6. While the lowest h_index in Table 3 is Geng Yong with an h_index of 5 and received citations from other researchers 213 times.

Most Cited Countries

The results of the analysis show that research related to relevant topics is dominated by China. The high number of publications and the active involvement of academic and research

institutions in China in producing scientific literature in this field. China contributes the most articles and is utilized by other researchers as a reference source. Based on the above, it is known that China is the country most cited by researchers in the world with the theme of green accounting and sustainability performance, as many as 6007 times. Then the second largest is Italy, which is 3850 times, followed by the United Kingdom, USA, Finland, and Germany.

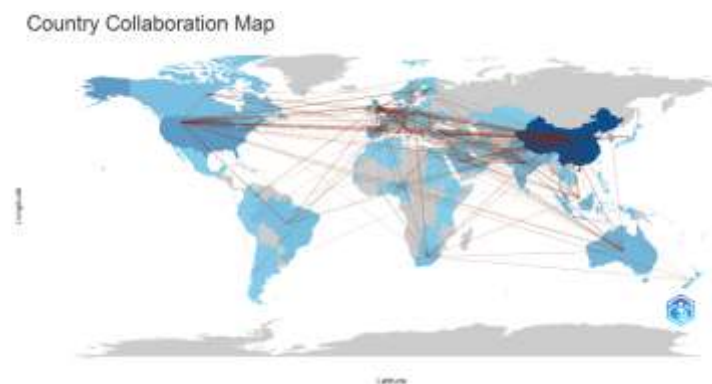


Source: Output Biblioshiny, 2024

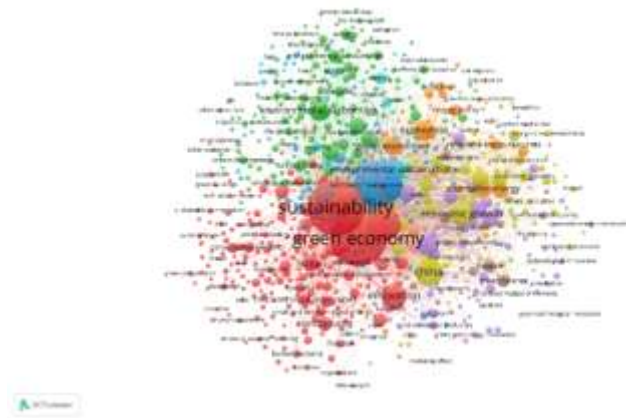
Figure 6. Most Cited Countries

Country Collaboration Map

China developed its collaboration network with other countries, such as: Pakistan, Malaysia, Turkey, Saudi Arabia, United Kingdom, USA, Italy, Australia, India, Spain, Uzbekistan, Japan, Lebanon and Thailand. Collaborations carried out in each country are carried out by several university affiliates. The most dominating Chinese university in this case is Jiangsu University which is also the leading affiliate in scientific publications.



Source: Output Biblioshiny, 2024



Source: Output VOSviewer, 2024

Figure 9. Network Map

Density Visualization

The density visualization shows that there are certain areas that are the main focus of research. For example, "sustainability" and "green economy" have a high intensity, indicating that a lot of research is contributing to these topics. In contrast, topics such as "green technological innovation" and "environmental policy" have lower intensities, indicating the potential for more research in these areas. According to the results of data analysis through VOSviewer, some topics that can be raised related to green accounting and sustainability performance for future research include: green technological innovation, green process innovation, green consumption, and firm performance.



Discussion

In terms of the highest level of productivity, number of publications, citations, the analysis shows that Almeida CMVB and Giannetti BF are ranked equally. In addition, Pulselli FM is followed by Pulselli FM as the top author. These three are part of the 0.6% most productive authors. Meanwhile, 93% of researchers totaling 4588 out of a total of 4937 only produced 1 article, the rest less than 1% of researchers were able to produce articles more than 3 documents.

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heavily involved in this research, which reinforces the country's dominance in the international literature. Some of the institutions that stand out in their contribution to green accounting and sustainability performance research are Jiangsu University. These institutions are not only active in producing publications but also in international collaboration, which increases the visibility and impact of their research at the global level. China also leads the development of research with a collaborative model. China has developed collaborative networks with many countries.

The results of the network visualization show that there are 10 main clusters, including the red cluster (sustainability and green economy), green cluster (environmental accounting and environmental impact), blue cluster (economic sustainability and sustainable development), yellow cluster (economic growth and innovation), Purple cluster (global warming and environmental regulation), light blue cluster (economic system and environmental sustainability), orange cluster (economics growth and economics analysis), brown cluster (green finance and green financing), pink cluster (sustainability performance and sustainability economy), and peach cluster (environmental and sustainable).

CONCLUSION

Research on green accounting and sustainability performance over a period of 34 years (1991 - 2024) produced 1684 documents from 577 sources, most of which came from journals. The year 2023 is the most productive year with 410 publications. The most productive researchers are Almeida CMVB, Giannetti BF, and Pulselli FM, and the most collaborations were dominated by China. The development of research on green accounting and sustainability performance needs to continue to be developed and explore and examine bibliometric analysis using other tools or using several features simultaneously in order to provide a more comprehensive picture of trends and patterns in the scientific literature being analyzed.

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